

 Institute of the Meteorology and Water Management
Maritime Branch in Gdynia

Grażyna Sapota

Persistent organic pollutants remained in the environment of the Baltic Sea - temporal trends and present conditions

the Baltic Sea

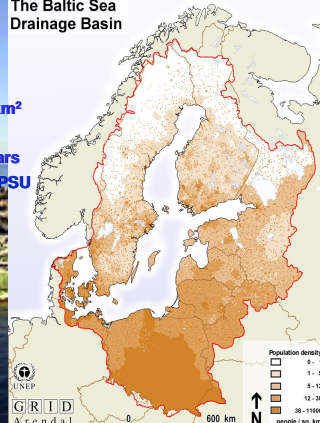
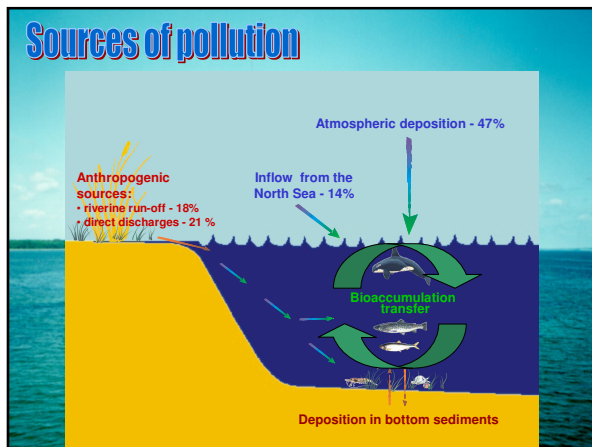
The Baltic Sea Drainage Basin

- Baltic Sea area = 415,266 km²
- catchment area = 1.721 million km²
- average depth = 53 m
- water residence time = 25-35 years
- salinity of surface water = 1-20 PSU

• 85 million people (45% in Poland)

• population density > 500 inhabitants per km²

• 15 million people live within 10 km of the coastline


Sources of pollution

Point sources of pollutants - hot spots:

- industry
- agriculture
- waste management
- municipal
- coastal lagoons

Secondary sources of pollutants:

- dumping grounds
- waste management
- old pesticides dumping sites
- DDT - 400 t
- lindan - 100 t
- HCB - 37 t




Material and method

Biota

- the measurements of POPs were carried out within Monitoring Programme HELCOM/COMBINE
- the muscle tissue of 2+, 3+ years old famles of herring (n=20) were collected once a year
- the temporal trends were calculated on the ground of the HELCOM Database
- Investigated substances: o,p'-DDT, p,p'-DDT, p,p'-DDE, p,p'-DDD, HCB, HCH isomers, PCBs (IUPAC No 28, 52, 101, 118, 138, 153, 180)

Wladyslawowo fishing ground



r/v BALTICA

biota and bottom sediments
rel. Humidity cover

freeze-dried

gravimetric analysis and organic matter content

hot Soxhlet extraction
Hexane + acetone (1:2 vol)

clean-up
silicagel column (acid and basic layer)

capillary gas chromatography
ECD detector

Internal standard

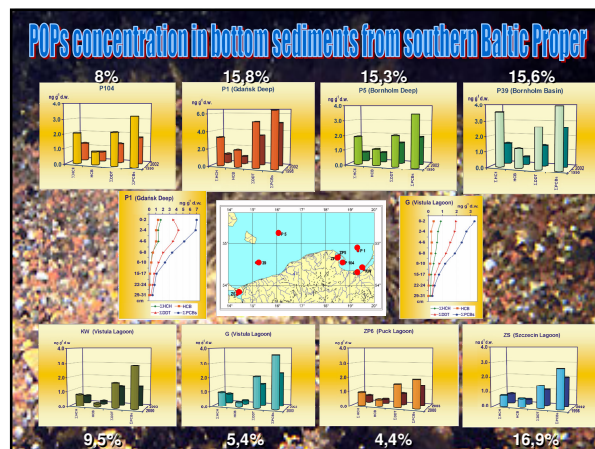
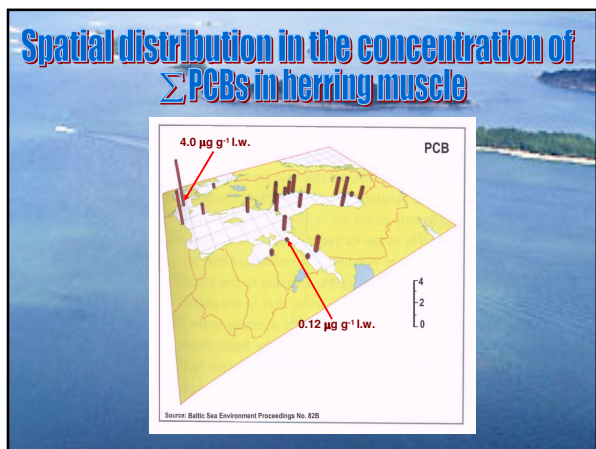
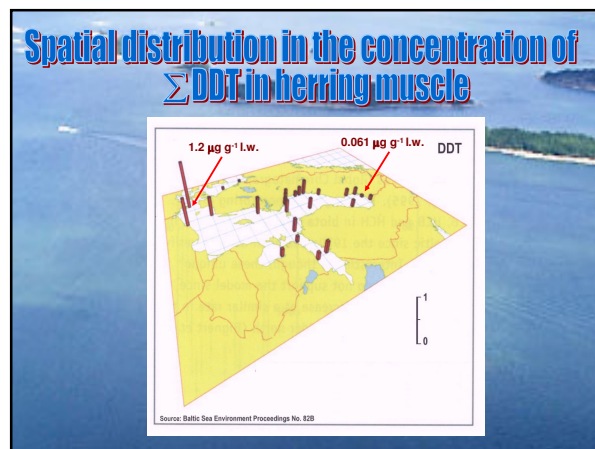
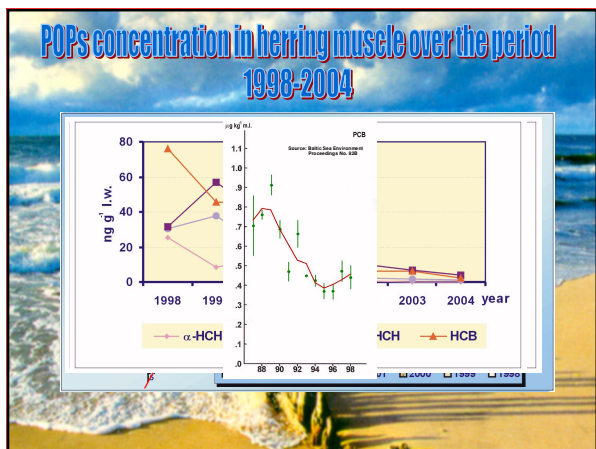
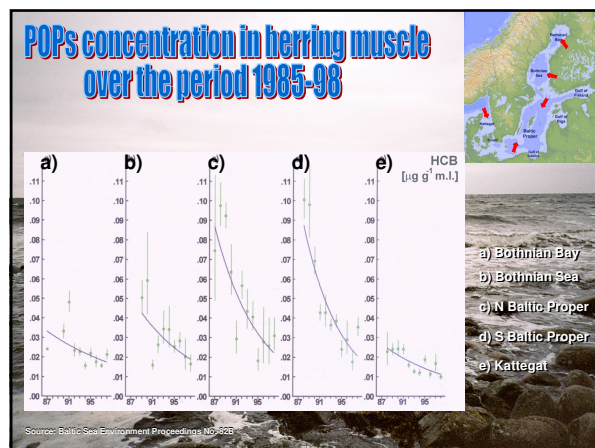
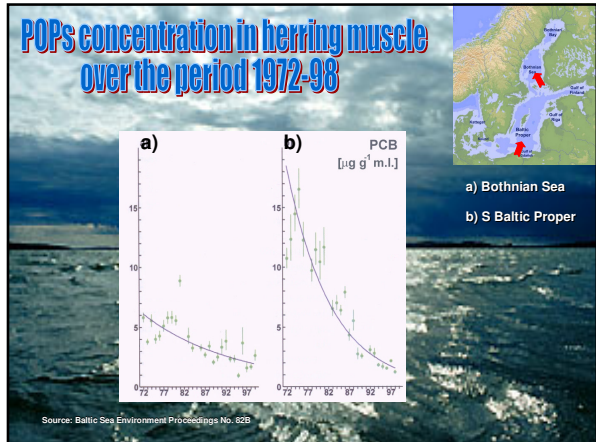
identification and quantification
according to Helcom 28, 1998

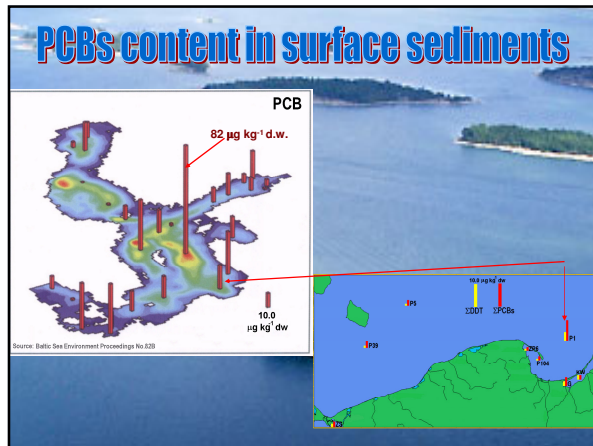
Material and method

Bottom sediments

- 8 sampling stations (Szczecin Lagoon, Bornholm Basin, Bornholm Deep, Gdansk Deep, Gulf of Gdansk, Puck Lagoon, Vistula Lagoon)
- the samples were collected in five years intervals
- 3 sediment cores (0-31 cm depth) were divided on 2 cm slices from 0 to 10 cm depth and 2 cm slices were taken from 15-17 cm, 22-24, 29-31 cm depth





Conclusions

- ◆ The presence of all investigated substances in the Baltic Sea environment was confirmed
- ◆ The measurements executing within Integrated Monitoring Programme of the Baltic Sea Environment HELCOM/COMBINE confirmed declines in the levels of persistent organic pollutants in herring muscle from the Baltic Sea over the past 30 years
- ◆ The biggest decrease of the amount of all POPs was noted during the period 1970-1990
- ◆ The content of less chlorinated and less persistent PCB congeners increased in the Baltic herring samples during 1990s

Conclusions

- ◆ The concentrations of POPs in bottom sediments were dependent on distance from the shore
- ◆ Riverine transport was the factor governing the distribution of POPs in the sediments
- ◆ A decrease of the content of POPs in the sediments was noted over the period 1998-2003

